PROTECTING ELECTRONIC DEVICES FROM EXTENDED UNAUTHORIZED USE

BACKGROUND OF THE INVENTION

[0001] Most people are familiar with rechargeable-power supplies (e.g., rechargeable batteries) and use them in everyday life. More traditional devices (e.g., mechanical toys) operating with a rechargeable-power-supply (e.g., a battery) have been in use for sometime now. More recently, various types of electronic devices (e.g., digital music-players) have been introduced and have become very popular. Similar to more traditional devices, some of these electronic devices operate with a rechargeable-power-supply. One such electronic device is the Apple iPod digital music-player: (iPod). Apple iPod has become very popular and is generally known at least in the United States. Apple iPod digital music-player is powered by a rechargeable battery that can be recharged by connecting a recharge-circuit directly or indirectly to a power-supply (e.g., electric outlet found in most homes). The battery that runs the Apple iPod digital music-player can be recharged by using an adapter that effectively connects a recharge-circuit to a power-supply or indirectly via a connection (e.g., USB**2**) to a Personal Computer (PC).

[0002] In general, a rechargeable-power-supply that powers a device can be recharged by a recharging mechanism. Such devices (e.g., portable electronic device, mechanical toy) are typically valuable and/or may contain valuable data (e.g., music files). As such, techniques for protecting devices against unauthorized use would be useful.

SUMMARY OF THE INVENTION

[0003] Broadly speaking, the invention pertains to techniques for protecting against extended unauthorized use of device. It will be appreciated that hindering the normal use and enjoyment of devices which are in use without proper authorization (e.g., disabling the ability of such devices to be recharged) can serve as a deterrent to theft. This should also result in a significant reduction of crime against the lawful owners of such devices.

[0004] In accordance with one aspect of the invention, when unauthorized use of a device is suspected, a recharging mechanism (e.g., recharge-circuit) of the device is disabled in order to guard against extended unauthorized use of the device. The recharging mechanism normally recharges the rechargeable-power-supply that powers the device. Consequently, normal use and enjoyment of the device can be significantly reduced when the recharger is disabled. Moreover, for devices that are mainly powered by a rechargeable-power-supply (e.g., music-players, phones, Personal Digital Assistants), disabling the recharger effectively renders the device inoperable when the power of the main power-supply has run out.

[0005] In one embodiment, unauthorized use is suspected when an event, condition, or situation occurs (e.g., a timer expires, device is connected to a power-supply or another device, device is outside a determined geographical boundary). In any case, when unauthorized use is suspected, an authorization process can be initiated (e.g., an authorization-code or security-code may be requested). If the authorization process fails to authorize the user, the recharger mechanism is disabled so that it can no longer recharge the rechargeable-power-supply. The recharger may subsequently be enabled if the user can be authorized.

[0006] In accordance with another embodiment of the invention, a device can automatically detect whether it has been just connected to another component (e.g., adapter, personal computer) that has not been authorized. Hence, an authorization process may be initiated when the device is connected to an unauthorized device. However, a lawful owner of the device can configure and authorize devices that are known by a unique identifier (e.g., adapter-id, processor-id) and authorize a new device during the authorization process.

[0007] Another aspect of the invention pertains to techniques for detecting unauthorized use of devices. When a connection is made to a device, it is determined whether the device is authorized for use (e.g., has not been reported stolen, not out of a geographical boundary). Typically, devices make a connection to a service provider (e.g., server) to request services (e.g., down-load music, check account). As such, it is possible to check for unauthorized use of the devices based on various criteria. If unauthorized use of the device is suspected one or more operations can be performed to effectively hamper the normal use and enjoyment of the devices. These operations include: disabling the recharger mechanism, disabling the downloading capability, and not allowing the requested operation.

[0008] The invention can be implemented in numerous ways, including a method, an apparatus, a computer readable medium, a computing device, or a signal embodied in a carrier wave. Several embodiments of the invention are discussed below.

[0009] Other aspects and advantages of the invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, illustrating by way of example the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The present invention will be readily understood by the following detailed description in conjunction with the accompanying drawings, wherein like reference numerals designate like structural elements, and in which:

[0011] FIG. **1**A depicts a device in accordance with one embodiment of the invention.

[0012] FIG. **1**B depicts a device-protection method for protecting device against unauthorized use in accordance with one embodiment of the invention.

[0013] FIG. **2** depicts a device protection method for protecting a device in accordance with one embodiment of the invention.

[0014] FIG. **3**A depicts a device which is protected by a guardian from unauthorized use in accordance with another embodiment of the invention.

[0015] FIG. **3**B depicts a device protection method for protecting a device in accordance with one embodiment of the invention.

[0016] FIG. **4** depicts a guardian provided in a computing system for protection of one or more devices in accordance with one embodiment of the invention.

[0017] FIG. **5** depicts a monitoring method for monitoring activities of devices in accordance with one embodiment of the invention.